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坑道直流电阻率超前聚焦探测新方法研究

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摘要 研究和提出了一种坑道直流电阻率超前聚焦探测新方法.该方法通过在掌子面上设立不同功能的环状电极组，使一次场电流具有像探照灯一样的聚焦功能，可有效探测坑道掘进前方不良地质体的存在,达到超前预报的目的.本文首先介绍了直流电阻率超前聚焦探测的基本原理,并给出了两种聚焦观测方式.为了验证所提方法的可行性，通过轴对称电性介质二维异常电位有限元数值模拟方法，对聚焦观测条件下几例坑道模型进行了模拟计算.结果表明，该方法对异常反映明显，可进行即时解释，建议在坑道超前预报中逐步推广使用.

关键词 坑道 直流电阻率 超前聚焦探测 有限元

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Research on a new method of advanced focus detection with DC resistivity in tunnel

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Abstract We research and put forward a new method of advanced focus detection for DC resistivity in tunnel. This method can make the primary field current to focus like a searchlight through setting up different circular electrode groups on the working face, and can effectively detect the existence of bad geologic body ahead tunneling and aim at the goal of advanced prediction. This paper firstly introduces the primary principle of advanced detection with DC resistivity and gives two kinds of surveying method of focus. In order to verify the feasibility of this method, we simulated several tunnel models of axial-symmetric electrical media in the focus surveying condition using 2-D finite element method of anomaly potential, and the modeling results show that this method can obviously reflect the anomaly, and the data can be real-time interpreted. We propose to popularize and use this method to advanced prediction of tunnel gradually.

Key words Tunnel; DC resistivity; Advanced focus detection; FEM

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